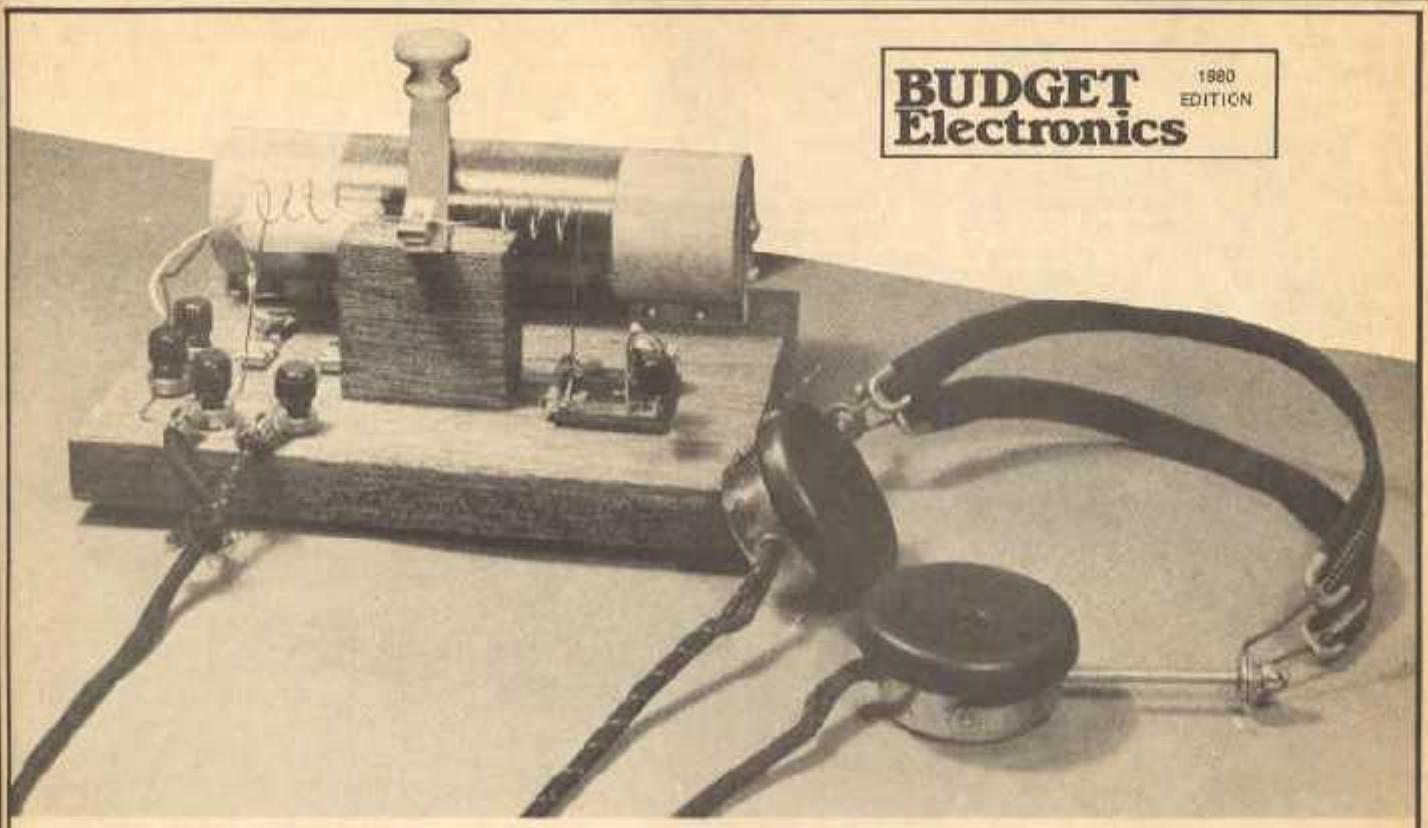

CLASSIC CRYSTAL

A low-cost crystal set that will enrich any collection.

by George Campbell

YOU CAN RELIVE THOSE EARLY days of broadcasting by building this authentic reproduction of a crystal radio from the early part of this century. This afternoon's project uses the same components, mostly hand-built, that your grandfather used to use, and costs less than $10 to build.

The heart of this receiver is an authentic crystal detector, using a natural galena crystal and a cat-whisker. It is available by mail order (see parts list for ordering information). The coil and the condenser are also handmade, using original techniques from the early '20s.

Old-Style Components. Begin by laying out the wood base according to the drawing. You may use any wood you choose, as long as it's dry and well-seasoned. Drill 3/32-inch pilot holes for the screws and 5/32-inch holes for the binding posts. Counterdrill the binding post holes ¾-inches deep with a ⅜-inch bit. Glue the slider support block to the base, then give the entire base two coats of shellac, the original finish for most of those old-time sets.

While the base dries, make the coil and condenser. The coil is wound on 4 inches of a 7-inch section of a rolling pin. Remove the handle from one end and withdraw the iron rod that passes through the rolling pin. Cut the rolling pin to length, and put the nylon bearing from the unused end of the pin in the hole in the 7-inch section.

Drill 1/16-inch holes completely through the wood, 1½ inches from each end. Use the original rod from the pin as an axle, and carefully wind a single, smooth layer of No. 25, coated copper magnet wire between the holes. The coil must be tight, with no overlaps. Pass the wire ends through the pre-drilled holes to anchor the coil, then give it two coats of shellac.

The crystal/whisker act as a rectifier diode to detect audio from the tuned LC circuit.

Next, cut the parts of the condenser as shown in the diagram. On a hard surface, stack the strips together, beginning with the Kraft paper, then waxed paper, then foil, waxed paper, foil, waxed paper, and Kraft paper.

The roll-your-own capacitor is made of metal foil and paper—just like the old days.

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The L-shaped ends of the foil should be at opposite ends of the stack, and protrude from opposite sides. Make sure the foil is centered between the layers, then bind the edges of the condenser together up to the foil with masking tape. Roll the bundle up tightly. Cover the completed condenser with masking tape and crush the protruding foil into wire-like leads.

Make the slider from a ⅛- by ½-inch brass strip, 6 inches long. Round the corners with a file and drill a 5/32-inch pivot hole, 1 inch from one end and a 3/16-inch hole for the knob at the other. Solder a 3-inch piece of No. 12 bare copper wire to the underside of the slider to make contact with the coil.

Assembly. Mount all components on the base, using No. 5 x ½ inch brass, round-head wood screws. Place a fiber washer under the tuning slide pivot to reduce friction. Locate the tuning coil so that the holes in the nylon bushings line up with the top holes in the brass L-brackets. Use a No. 8 wood screw here. Attach the rubber feet to the bottom of the base.

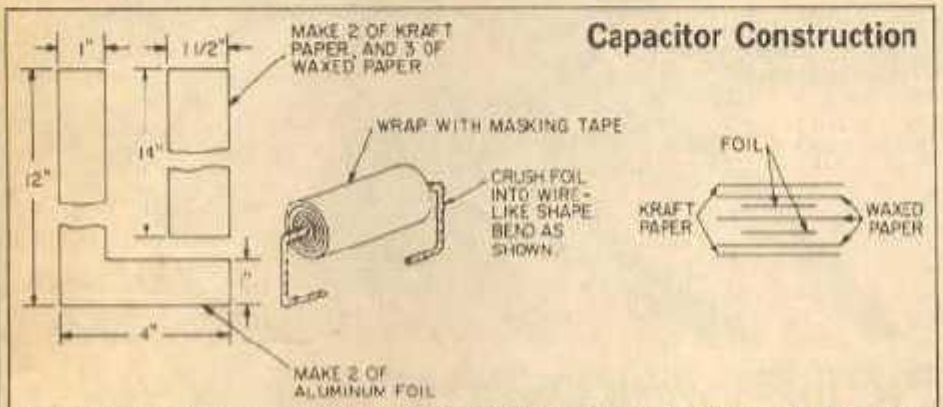
Wire the receiver according to the drawing, using No. 20 copper wire. Remove the insulation and shellac from the top of the tuning coil with fine sandpaper, and bend the tuning slide slightly to provide good contact with the bare wire of the coil.

To use your crystal set, connect the antenna binding post to a good anteanna (one side of a TV lead-in works well). The ground post must be connected to a good ground, such as a cold water pipe. The headphones used with this set must be the high impedance type. Normal stereo headsets will not work with this primitive receiver. If you wish, you can attach the center conductor of a shielded cable to binding post J3, the shield to J4, and plug the other end into an amplifier to provide loudspeaker reception and easier listening.

Locate a sensitive spot on the galena crystal by slowly dragging the cat-whisker spring over its surface with the tuning slide centered on the coil. Once a sensitive spot is found, you should hear a local station clearly. Tuning this receiver takes time and patience, so don't give up.

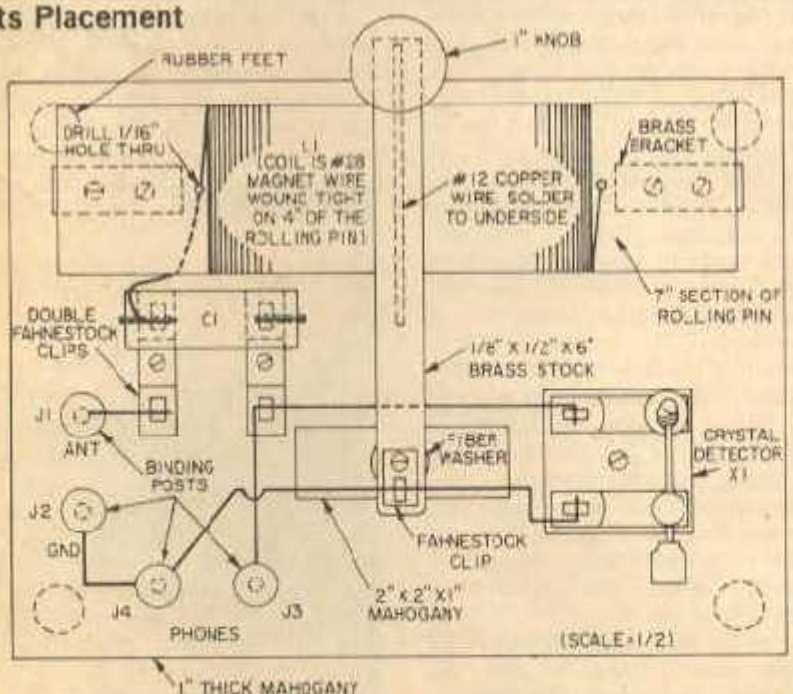
Don't be surprised if you hear more than one station at once. Crystal sets are not very selective. However, careful adjustment of the tuning slide should separate stations reasonably well. And who knows? One day you may even hear a voice from the past. ■

Capacitor Construction

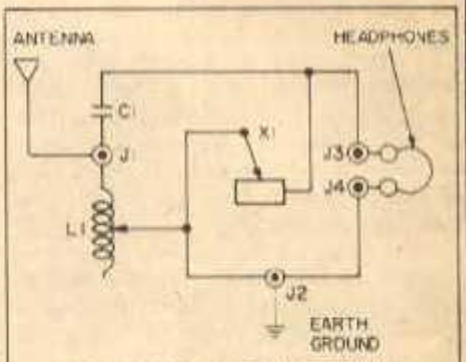


To build the capacitor (C1) cut strips of aluminum foil, kraft paper, and wax paper according to the patterns above. Then interleave the strips as shown above, with the L-shaped ends of foil at opposite ends of the bundle, facing in opposite directions. Bind the edges with masking tape and roll the bundle tightly. Test it with a VOM: if the meter moves and then goes back to infinite resistance then C1 is OK. If not, rebuild C1.

Parts Placement



This parts' location diagram shows the relative positions of all the parts. It is drawn to half-scale, so multiply any distance by two to get the full-scale measurements. The wire connections are the bold lines. Wind the coil for four inches along the rolling pin. The non-functional coils on each side of the wiper in the photograph are for decoration.



PARTS LIST FOR CRYSTAL SET REPLICA

C1—capacitor (see diagram)
J1, J2, J3, J4—birding posts
L1—tuning coil (see text and diagram)
X1—Crystal detector, available from: Johnson Smith Company, 35075 Automation Drive, Mt. Clemens, MI 48043. Order catalog No. 6590. Enclose $1.95 plus $0.60 for postage and handling. Allow 3 weeks for delivery.
Misc.—6- x 8-inch wooden base, 2- x 2- x 1-inch wood slider support block, aluminum foil, wax paper, kraft paper, 150 feet No. 26 coated, copper magnet wire, 3 feet No. 20 copper wire, 3 inches No. 12 copper wire, wooden rolling pin, 2 No. 18 double Fahnestock clips, 1 No. 18 single Fahnestock clip, ⅛- x ½- x 6-inch brass strip, fiber washer, rubber feet, wooden knob, two 1½-inch brass "L"-brackets, assorted brass round-head wood screws.